WHAT IS CLAIMED IS:

1. An anti-mesothelin antibody which binds to recombinant mesothelin with a dissociation constant of less than 3×10^{-8} M and specifically binds to cells expressing mesothelin on their cell surface.

2. The antibody of claim 1, wherein the CDRs of said antibody are as indicated in SEQ ID NO:5.

3. The antibody of claim 1, comprising a single chain Fv antibody comprising a variable heavy (V_H) region and a variable light (V_L) region.

4. The antibody of claim 3, wherein said V_L is conjugated to said V_H through a linker peptide.

5. The antibody of claim 3, wherein said antibody is a dsFv.

6. The antibody of claim 3, wherein the variable heavy (V_H) region is encoded by SEQ ID NO:1.

7. The antibody of claim 3, wherein the variable light (VL) region is encoded by SEQ ID NO:1.

8. The antibody of claim 3, wherein said single chain Fv antibody comprises a variable heavy (V_H) region and a variable light (V_L) region encoded by SEQ ID NO:1.

9. The antibody of claim 1, wherein said antibody is detectably labeled.

10. The antibody of claim 1, wherein said antibody is conjugated to an therapeutic agent.

11. The antibody of claim 10, wherein said therapeutic agent is a toxin.

12. The antibody of claim 11, wherein said toxin is a *Pseudomonas* exotoxin (PE) or cytotoxic fragment thereof.

13. An anti-mesothelin antibody wherein the variable heavy (V_H) region is as shown in SEQ ID NO:5.

14. An anti-mesothelin antibody wherein the variable light (V_L) region is as shown in SEQ ID NO:5.

15. An anti-mesothelin antibody wherein the CDRs are as shown in SEQ ID NO:5.

16. An anti-mesothelin antibody wherein said antibody comprises a variable heavy (V_H) region and a variable light (V_L) region of SEQ ID NO:5.

17. The antibody of claim 16, wherein said antibody is a scFv.

18. An anti-mesothelin antibody, said antibody produced by a process comprising of the steps:

(i) immunizing a mammal with an expression cassette which comprises cDNA encoding mammalian mesothelin;

(ii) removing the spleen from said mammal;

(iii) preparing a phage display library from said spleen of said animal;

(iv) selecting for a phage which displays an antibody which binds to recombinant mesothelin with a dissociation constant of less than 3×10^{-8} M and specifically binds to cells expressing mesothelin on their cell surface;

(v) isolating the nucleic acid sequence which encodes said antibody;

(vi) introducing said nucleic acid sequence into a cell such that said antibody is expressed by said cell; and

(vii) isolating said antibody from said cell.

19. The antibody of claim 18, further comprising recombinantly fusing in frame said nucleic acid sequence with a nucleic acid sequence which encodes a *Pseudomonas* exotoxin or cytotoxic fragment thereof.

20. A recombinant immunoconjugate, comprising a therapeutic agent or a detectable label bonded to an anti-mesothelin antibody which binds to recombinant mesothelin with a dissociation constant of less than 3×10^{-8} M and specifically binds to cells expressing mesothelin on their cell surface.

21. The immunoconjugate of claim 20, wherein CDRs of said antibody are as indicated in SEQ ID NO:5.

22. The immunoconjugate of claim 20, comprising a single chain Fv antibody comprising a variable heavy (V_H) region and a variable light (V_L) region.

23. The immunoconjugate of claim 22, wherein said V_H region is peptide bonded to said V_L region through a linker peptide.

24. The immunoconjugate of claim 22, wherein the variable heavy (V_H) region is encoded by SEQ ID NO:1.

25. The immunoconjugate of claim 22, wherein the variable light (V_L) region is encoded by SEQ ID NO:1.

26. The immunoconjugate of claim 22, wherein said single chain Fv antibody comprises a variable heavy (V_H) region and a variable light (V_L) region of SEQ ID NO:1.

27. The immunoconjugate of claim 20, wherein said antibody is conjugated to a therapeutic agent.

28. The immunoconjugate of claim 27, wherein said therapeutic agent is a toxin.

29. The immunoconjugate of claim 28, wherein said toxin is a *Pseudomonas* exotoxin (PE) or cytotoxic fragment thereof.

30. The immunoconjugate of claim 29, wherein said cytotoxic fragment is PE38.

31. The immunoconjugate of claim 20, wherein said variable heavy (V_H) region is peptide bonded to the therapeutic agent or detectable label.

32. The immunoconjugate of claim 20, wherein said immunoconjugate is encoded by SEQ ID NO:2.

33. An expression cassette encoding said antibody of claim 3.

34. The expression cassette of claim 33, wherein the CDRs of said antibody are as indicated in SEQ ID NO:5.

35. The expression cassette of claim 33, comprising a single chain Fv antibody comprising a variable heavy (V_H) region and a variable light (V_L) region.

36. The expression cassette of claim 35, wherein V_H region is peptide bonded to said V_L region through a linker peptide.

37. The expression cassette of claim 35, wherein the variable heavy (V_H) region is encoded by SEQ ID NO:1.

38. The expression cassette of claim 35, wherein the variable light (V_L) region is encoded by SEQ ID NO:1.

39. The expression cassette of claim 35, wherein said single chain Fv antibody comprises a variable heavy (V_H) region and a variable light (V_L) region of SEQ ID NO:1.

40. The expression cassette of claim 33, wherein said antibody is detectably labeled.

41. The expression cassette of claim 33, wherein said antibody is conjugated to a therapeutic agent.

42. The expression cassette of claim 41, wherein said therapeutic agent is a toxin.

43. The expression cassette of claim 42, wherein said toxin is a *Pseudomonas* exotoxin (PE) or cytotoxic fragment thereof.

44. An expression cassette encoding said recombinant immunoconjugate of claim 22.

45. The expression cassette of claim 44, wherein CDRs of said antibody are as indicated in SEQ ID NO:5.

46. The expression cassette of claim 44, wherein said antibody is a single chain antibody comprising of a variable heavy (V_H) region and a variable light (V_L) region.

47. The expression cassette of claim 46, wherein said V_H region is peptide bonded to said V_L region through a linker peptide.

48. The expression cassette of claim 46, wherein the variable heavy (V_H) region is encoded by SEQ ID NO:1.

49. The expression cassette of claim 46, wherein the variable light (V_L) region is encoded by SEQ ID NO:1.

50. The expression cassette of claim 46, wherein said single chain antibody comprises a variable heavy (V_H) region and a variable light (V_L) region of SEQ ID NO:1.

51. The expression cassette of claim 44, wherein said therapeutic agent is a toxin.

52. The expression cassette of claim 51, wherein said toxin is a *Pseudomonas* exotoxin (PE) or a cytotoxic fragment thereof.

53. The expression cassette of claim 52, wherein said cytotoxic fragment is PE38.

54. The expression cassette of claim 52, wherein a variable heavy region is peptide bonded to the *Pseudomonas* exotoxin (PE) or cytotoxic fragment thereof.

55. A host cell comprising said expression cassette of claim 33.

56. The host cell of claim 55, wherein the CDRs of said antibody are as indicated in SEQ ID NO:5.

57. The host cell of claim 55, comprising a single chain Fv antibody comprising a variable heavy (V_H) region and a variable light (V_L) region.

58. The host cell of claim 57, wherein said V_H region is peptide bonded to said V_L region through a linker peptide.

59. The host cell of claim 57, wherein the variable heavy (V_H) region is encoded by SEQ ID NO:1.

60. The host cell of claim 57, wherein the variable light (V_L) region is encoded by SEQ ID NO:1.

61. The host cell of claim 57, wherein said single chain Fv antibody comprises a variable heavy (V_H) region and a variable light (V_L) region of SEQ ID NO:1.

62. The host cell of claim 55, wherein said antibody is detectably labeled.

63. The host cell of claim 55, wherein said antibody is conjugated to a therapeutic agent.

64. The host cell of claim 63, wherein said therapeutic agent is a toxin.

65. The host cell of claim 64, wherein said toxin is a *Pseudomonas* exotoxin (PE) or cytotoxic fragment thereof.

66. A host cell comprising said expression cassette of claim 44.

67. The host cell of claim 66, wherein CDRs of said antibody are as indicated in SEQ ID NO:5.

68. The host cell of claim 66, wherein said antibody is a single chain antibody comprising of a variable heavy (V_H) region and a variable light (V_L) region.

69. The host cell of claim 57, wherein said V_H region is peptide bonded to said V_L region through a linker peptide.

70. The host cell of claim 57, wherein the variable heavy (V_H) region is encoded by SEQ ID NO:1.

71. The host cell of claim 57, wherein the variable light (V_L) region is encoded by SEQ ID NO:1.

72. The host cell of claim 57, wherein said single chain antibody comprises a variable heavy (V_H) region and a variable light (V_L) region of SEQ ID NO:1.

73. The host cell of claim 63, wherein said therapeutic agent is a toxin.

74. The host cell of claim 73, wherein said toxin is a *Pseudomonas* exotoxin (PE) or a cytotoxic fragment thereof.

75. The host cell of claim 74, wherein said PE is PE38.

76. A method for inhibiting the growth of a malignant cell expressing mesothelin on its cell surface, said method comprising:

contacting said malignant mesothelial cell with an effective amount of an immunoconjugate comprising a toxin peptide bonded to an anti-mesothelin antibody which binds to recombinant mesothelin with a dissociation constant of less than 3×10^{-8} M and specifically binds to cells expressing mesothelin on their cell surface.

77. The method of claim 76, wherein said antibody comprises CDRs as indicated in SEQ ID NO:5.

78. The method of claim 76, wherein said anti-mesothelin antibody is a single chain Fv antibody comprising a variable heavy (V_H) region and a variable light (V_L) region.

79. The method of claim 78, wherein said V_H region is peptide bonded to said V_L region through a linker peptide.

80. The method of claim 78, wherein the variable heavy (V_H) region is encoded by SEQ ID NO:1.

81. The method of claim 78, wherein the variable light (V_L) region is encoded by SEQ ID NO:1.

82. The method of claim 78, wherein said scFv fragment comprises a variable heavy (V_H) region and a variable light (V_L) region of SEQ ID NO:1.

83. The method of claim 76, wherein said toxin is a *Pseudomonas* exotoxin (PE) or a cytotoxic fragment thereof.

84. The method of claim 83, wherein said PE is PE38.

85. The method of claim 83, wherein a variable heavy region is peptide bonded to the toxin.

86. The method of claim 76, wherein said malignant cell is contacted *in vivo*.

87. The method of claim 76, wherein said malignant cell is selected from the group malignancies consisting of mesotheliomas, ovarian cancer, stomach cancer and squamous cell cancer.

88. A method for detecting the presence of mesothelin in a biological sample, said method comprising:

(i) contacting said biological sample with an anti-mesothelin antibody which binds to recombinant mesothelin with a dissociation constant of less than 3 x 10^{-8} M and specifically binds to cells expressing mesothelin on their cell surface;

(ii) allowing said antibody to bind to mesothelin under immunologically reactive conditions, wherein detection of said bound antibody indicates the presence of said mesothelin.

89. The method of claim 88, wherein said antibody comprises CDRs as indicated in SEQ ID NO:5.

90. The method of claim 88, wherein said anti-mesothelin antibody is a single chain Fv antibody comprising a variable heavy (V_H) region and a variable light (V_L) region.

91. The method of claim 90, wherein said V_H region is peptide bonded to said V_L region through a linker peptide.

92. The method of claim 90, wherein the variable heavy (V_H) region is encoded by SEQ ID NO:1.

93. The method of claim 90, wherein the variable light (V_L) region is encoded by SEQ ID NO:1.

94. The method of claim 90, wherein said scFv fragment comprises a variable heavy (V_H) region and a variable light (V_L) region of SEQ ID NO:1.

95. The method of claim 88, wherein said antibody is detectably labeled.

96. The method of claim 88, wherein the method is performed *in vivo* in a mammal.

97. A pharmaceutical composition comprising the immunoconjugate of claim 20.

98. A kit for detecting mesothelin on the surface of cells, said kit comprising:

(i) an anti-mesothelin antibody which binds to recombinant mesothelin with a dissociation constant of less than 3×10^{-8} M and specifically binds to cells expressing mesothelin on their cell surface; and

(ii) instructions printed on a tangible medium, said instructions describing the methods of using and uses for said antibody.